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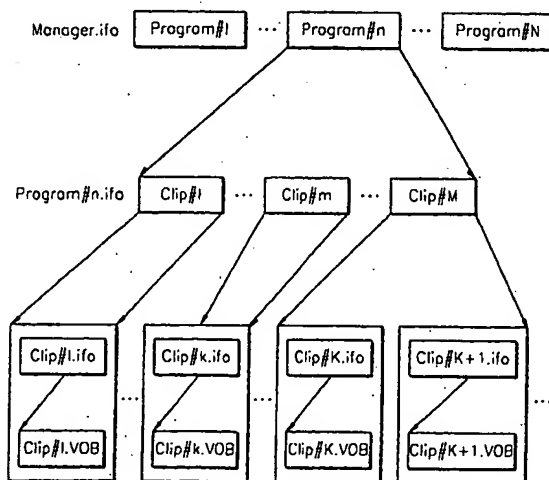
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(54) Title: METHOD AND APPARATUS FOR RECORDING VIDEO DATA, AND INFORMATION STORAGE MEDIUM  
THEREBY



(57) Abstract: Method and apparatus for recording video data on an information storage medium, and an information storage medium thereby are provided. The method includes (a) recording video data in a digital video format received from a camcorder in a plurality of clip files, (b) recording navigation data to navigate the clip files in a clip navigation file, (c) recording a program navigation file which represent at least one said clip files and at least a part of the corresponding clip navigation file, and (d) recording program information which represents at least one of the program navigation file, in a manager file. The video data in the format of digital video provided by the camcorder can be recorded on the information storage medium on which the video data can be randomly accessed, and the video data can be reproduced at a desired time.

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## METHOD AND APPARATUS FOR RECORDING VIDEO DATA, AND INFORMATION STORAGE MEDIUM THEREBY

### Technical Field

5           The present invention relates to a method for recording video data, and more particularly, to a method and apparatus for receiving video data provided by a camcorder and recording the video data on an information storage medium, and an information storage medium thereby.

### Background Art

10           Camcorders have been widely used. However, camcorders record video data on a video tape in the format of digital video (DV). However, the video data recorded on the video tape can be only sequentially accessed but cannot be randomly accessed. Furthermore, it is not easy to freely edit the video data recorded on the video tape.

15

### Disclosure of the Invention

          To solve the above problem, it is a first object of the present invention to provide a method and apparatus for recording video data in the format of digital video (DV) provided by a camcorder on an information storage medium on which  
20 the video data can be randomly accessed, and an information storage medium thereby.

          It is a second object of the present invention to provide a method and apparatus for recording video data in the format of digital video (DV) provided by a camcorder on an information storage medium on which the video data can be  
25 freely edited, and an information storage medium thereby.

          Accordingly, to achieve the above objects, according to one aspect of the present invention, there is provided a method for recording video data on an information storage medium. The method includes (a) recording video data in a digital video format received from a camcorder in a plurality of clip files, (b) recording navigation data to navigate the clip files in a clip navigation file,  
30 (c) recording a program navigation file which represent at least one said clip files

and at least a part of the corresponding clip navigation file, and (d) recording program information which represents at least one of the program navigation files, in a manager file.

5 It is preferable that step (a) includes (a1) receiving a digital interface format (DIF) sequence that is packaged with an IEEE 1394 packet, and (a2) recording the digital interface format (DIF) sequence in which the IEEE 1394 packet is striped off, in the plurality of clip files, or recording the digital interface format (DIF) sequence, which is one of digital video (DV) 25 or 50 formats, and step (a) is recorded substantially in real-time.

10 It is also preferable that step (b) includes recording mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, in the clip navigation file.

15 It is also preferable that step (c) includes recording an identifier of a corresponding clip file and start time and end time of duration of the corresponding clip file in the program navigation file.

To achieve the above objects, according to another aspect of the present invention, there is provided a method for recording video data on an information storage medium. The method includes (a) recording video data in a  
20 digital video format in a plurality of clip files in real-time, (b) recording navigation data to navigate the clip files in a clip navigation file, (c) recording a program navigation file which represents at least one said clip files and at least a part of the corresponding clip navigation file, and (d) recording program information which represents at least one of the  
25 navigation files, in a manager file.

It is preferable that step (b) includes recording mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, in the clip navigation file, or recording  
30 a broadcasting format of the vide data received in step (a) in the clip navigation file, and the broadcasting format is an NTSC or PAL mode.

To achieve the above objects, according to another aspect of the present invention, there is provided an apparatus for recording video data in a digital video format received from a camcorder on an information storage medium.

The apparatus includes a video interface which receives the video data, a  
5 recorder which records data on the information storage medium, and a controller which controls the recorder to let the recorder record video data inputted to the video interface in at least one clip file, to record navigation data to navigate the generated clip files in a clip navigation file, to record a program navigation file which represents at least one said clip files and at least a part of the  
10 corresponding clip navigation file, and to record program information which represents at least one of the program navigation file, in a manager file.

It is preferable that the video interface includes an IEEE 1394 port which receives an IEEE 1394 packet in which a digital interface format (DIF) sequence is packaged, and a buffer which stores the digital interface format (DIF) sequence  
15 in which the IEEE 1394 packet is striped off.

It is also preferable that the video interface receives a digital interface format (DIF) sequence, which is one of digital video (DV) 25 or 50 formats.

It is also preferable that the controller controls the recorder to let the recorder substantially record the video data received from the video interface in  
20 real-time and record mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, in the clip navigation file.

It is also preferable that the controller controls the recorder to let the recorder record an identifier of a corresponding clip file and start time and end  
25 time of duration of the corresponding clip file in the program navigation file.

To achieve the above objects, according to another aspect of the present invention, there is provided an information storage medium. The medium includes a plurality of clip files in which video data in the format of digital video received from a camcorder is recorded, a navigation file in which navigation data  
30 to navigate the clip files

is recorded, a program navigation file in which navigation data which represents at least one said clip files and at least a part of the corresponding clip navigation file is recorded, and a manager file in which program information is stored in at least one of the program navigation file.

- 5 It is preferable that a digital interface format (DIF) sequence in which the IEEE 1394 packet is striped off, is recorded in the clip files, and a digital interface format (DIF) sequence, which is one of digital video (DV) 25 or 50 formats, is recorded in the clip files.

- 10 It is also preferable that mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, is recorded in the clip navigation file. Specifically, it is more preferable that an identifier of a corresponding clip file and start time and end time of duration of the corresponding clip file are recorded in the program navigation file. Further, it is more preferable that a  
15 broadcasting format of video data recorded in the clip files is recorded in the clip navigation file, and the broadcasting format is an NTSC or PAL mode.

#### Brief Description of the Drawings

- The above objects and advantages of the present invention will become more apparent by describing in detail preferred embodiments thereof with  
20 reference to the attached drawings in which:

FIG. 1 is a block diagram of an apparatus for recording video data on an information storage medium according to a preferred embodiment of the present invention;

- 25 FIG. 2 is a reference diagram illustrating an example of a file structure of an optical disc on which video data are recorded, according to the present invention;

FIG. 3 is a reference diagram illustrating another example of the file structure of the optical disc on which video data are recorded, according to the present invention;

- 30 FIG. 4 illustrates a data structure which corresponds to the file structure shown in FIG. 2;

FIG. 5 illustrates a detailed structure of Program #n.ifo shown in FIG. 4;  
FIG. 6 illustrates a detailed structure of Clip #k.ifo shown in FIG. 4; and  
FIG. 7 is a flow chart illustrating a method for recording video data on an  
information storage medium.

5

Best mode for carrying out the invention

Hereinafter, the present invention will be described in detail by describing a preferred embodiment of the invention with reference to the accompanying drawings.

10 FIG. 1 is a block diagram of an apparatus for recording video data on an information storage medium according to a preferred embodiment of the present invention. Referring to FIG. 1, the apparatus for recording video data on an information storage medium includes a controller 1, a video interface 2, and a recorder 3. The video interface 2 receives video data in the format of digital  
15 video (DV) that is recorded on a video tape, from a camcorder (not shown). Actually, the video interface 2 may be implemented with an IEEE 1394 port and a buffer that are connected to the camcorder. The video data in the format of DV is a digital interface format (DIF) sequence that is packaged with an IEEE 1394 packet, is inputted to the IEEE 1394 port and is stored in a buffer in the form of  
20 DIF sequence in which the IEEE 1394 packet is striped off.

The controller 1 reads header information from the DIF sequence inputted to the video interface 2. The header information is information on the inputted DIF sequence and includes an employed video format and an employed broadcasting format (i.e., national television standards committee (NTSC)  
25 mode/phase alternation line (PAL) mode). Further, the header information may include information required for decoding such as an employed compression method and resolution, and other information. The controller 1 extracts at least a part of the header information and records the part of the header information on an optical disc 100, which is an information storage medium according to the  
30 present invention, through the recorder 3. In addition, the controller 1 generates

navigation data required to search for or reproduce the video data, and records the navigation data on the optical disc 100 through the recorder 3.

FIG. 2 is a reference diagram illustrating an example of a file structure of an optical disc on which video data are recorded, according to the present invention. Referring to FIG. 2, a directory for real-time record is provided in a root directory. Files in which the navigation data required to search for or reproduce the video data recorded on the optical disc 100 is recorded, such as Manager.ifo, Program #1.ifo, . . . , Program #N.ifo, Clip #1.ifo, . . . , and Clip #M.ifo, are stored in the real-time record directory. Files in which the video data is recorded, such as Clip #1.VOB, . . . , and Clip #K.VOB, are further stored in the real-time record directory.

General information on the video data recorded on the optical disc 100 may be recorded in the file Manager.ifo. The general information includes information such as the number of programs and duration time. The navigation data for a number N of programs that are recorded on the optical disc 100, is recorded in the files Program #1.ifo, . . . , and Program #N.ifo. The navigation data for each of at least one clip included in each program is recorded in the files Clip #1.ifo, . . . , and Clip #M.ifo. The actual video data is recorded in the files Clip #1.VOB, . . . , Clip #K.VOB, and Clip #K+1.VOB.

Program and clip represent title and subtitle of the video data shown to a user, respectively. For example, program means a movie 'Gone with the Wind', and three clips belonging to the program 'Gone with the Wind' mean first, second, and third parts.

FIG. 3 is a reference diagram illustrating another example of the file structure of the optical disc on which video data are recorded, according to the present invention. Referring to FIG. 3, a directory for real-time record is provided in a root directory. Files in which the navigation data required to search for or reproduce the video data recorded on the optical disc 100 is recorded, such as Manager.ifo, Program.ifo, and Clip.ifo, are stored in the real-time record directory.

A file in which the video data is recorded, such as Clip.VOB, is further stored in the real-time record directory. Compared the file structure of FIG. 3 with that of



FIG. 2, in the file structure of FIG. 2, the navigation data for a number N of programs is divided into a number N of files and recorded, whereas in the file structure of FIG. 3, the navigation data is incorporated into one file and recorded. The navigation data for a number M of clips is also incorporated into one file and recorded, and the clips in which the video data is recorded, are also incorporated into one file and recorded.

When the video data is divided into small files and recorded, it takes more time to search for a corresponding file, whereas if the corresponding file has been found out, a desired data can be immediately read. Conversely, when the video data is incorporated into one file and recorded, a corresponding file can be immediately found out, but even if the corresponding file has been found out, it takes more time to search for a desired data and to read it.

FIG. 4 illustrates the data structure which corresponds to the file structure shown in FIG. 2. Referring to FIG. 4, a number N of programs Program #1, . . . , Program #n, . . . , and Program #N are recorded on the optical disc 100. The program Program #n has a number M of clips Clip #1, . . . , Clip #m, . . . , and Clip #M. For example, a program called 'Gone with the Wind' has three clips comprised of first, second, and third parts.

Video data is recorded in predetermined units of clips Clip #1.VOB, . . . , Clip #k.VOB, . . . , Clip #K.VOB, and Clip #K+1.VOB. The clips Clip #1.VOB, . . . , Clip #k.VOB, . . . , Clip #K.VOB, and Clip #K+1.VOB correspond to files Clip #1.ifo, . . . , Clip #k.ifo, . . . , Clip #K.ifo, and Clip #K+1.ifo in which navigation data is recorded.

Program #n.ifo represents video data belonging to each of the clips included in the program Program #n. Video data belonging to the clip Clip #1 is recorded in the clip Clip #1.VOB. Video data belonging to the clip Clip #M is recorded in the clips Clip #K.VOB and Clip #K+1.VOB. For example, the first part of the program 'Gone with the Wind' is recorded in the clip Clip #1.VOB, the second part thereof is recorded in the clip Clip #k.VOB, and the third part thereof is recorded in the clips Clip #K.VOB and Clip #K+1.VOB.

FIG. 5 illustrates a detailed structure of Program #n.ifo shown in FIG. 4. Referring to FIG. 5, an identifier ID of a corresponding clip and start time and end time of duration of the clip are recorded in Program #n.ifo. When there are a plurality of clips, an identifier of a corresponding clip and start time and end time of duration of the clip are provided for each clip. In addition, information Program information #n on a corresponding program #n is recorded in Program #n.ifo. Program information #n includes title, duration time, and other information Etc 1 and Etc2.

FIG. 6 illustrates a detailed structure of Clip #k.ifo shown in FIG. 4. Referring to FIG. 6, mapping information Time to Address Map which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, and Bitstream information #k, which is information on a bit stream of the corresponding clip, are included in Clip #k.ifo. Bitstream information #k includes a video format and a broadcasting format. When the video format is a DIF sequence, which is video data provided by a camcorder, the video format may be recorded in the format of DV 25 and DV 50. DV 25 represents a digital video 25 Mbps format, and DV 50 represents a digital video 50 Mbps. When the video format is a MPEG transport stream other than the DIF sequence, the video format may be recorded in the format of MPEG. The broadcasting format may be recorded in an NTSC or PAL mode.

Here, the mapping information Time to Address Map which maps duration time information on the corresponding clip to address information in which video data belonging to the corresponding clip is recorded, is optional. This is because the position of the video data of the corresponding clip can be calculated from the video format and the broadcasting format even though there is no Time to Address Map.

A method for recording video data according to the present invention will be described on the basis of the above structure.

FIG. 7 is a flow chart illustrating a method for recording video data on an information storage medium.

Referring to FIG. 7, in step 701, the video interface 2 receives video data. In step 702, the controller 1 generates clips comprised of video data. In step 703, the controller 1 controls the recorder 3 to let the recorder 3 record each program in a data structure including at least one said clips. That is, the controller 1  
5 generates navigation data corresponding to the data structure so as to search for or reproduce the recorded programs and controls the recorder 3 to let the recorder 3 record the programs on the optical disc 100.

In step 703-1, the controller 1 generates navigation data for navigating, that is, reproducing, editing, and searching information on programs  
10 and records the navigation data. In step 703-2, the controller 1 generates navigation data for navigating, that is, reproducing, editing, and searching information on clips belonging to the programs and records the navigation data. In step 703-3, the controller 1 records navigation data for navigating, that is, reproducing, editing, and searching information on video data belonging to each  
15 clip recorded on the optical disc 100.

Step 703-1 includes generating navigation data including the number and title of programs and the size of data, step 703-2 includes generating navigation data for navigating, that is, reproducing, editing, and searching an identifier ID of a corresponding clip and start time and end time of duration of video data  
20 belonging to the corresponding clip, and step 703-3 includes generating navigation data for navigating, that is, reproducing, editing, and searching a video format and a broadcasting format and navigation data for navigating, that is, reproducing, editing, and searching the recording position corresponding to the start time and end time.

25

#### Industrial Applicability

As described above, according to the present invention, the video data in the format of DV provided by a camcorder can be recorded on the information storage medium on which the video data can be randomly accessed, and the  
30 video data can be reproduced at a desired time. Further, the video data in the

format of DV provided by the camcorder can be stored in the data structure in which the video data can be freely edited.

While this invention has been particularly shown and described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A method for recording video data on an information storage medium, the method comprising:
  - (a) recording video data in a digital video format received  
5 from a camcorder in a plurality of clip files;
  - (b) recording navigation data to navigate the clip files in a clip navigation file;
  - (c) recording a program navigation file which represent at least one said clip files and at least a part of the corresponding clip navigation  
10 file; and
  - (d) recording program information which represents at least one of the program navigation files, in a manager file.
2. The method of claim 1, wherein step (a) comprises:
  - 15 (a1) receiving a digital interface format (DIF) sequence that is packaged with an IEEE 1394 packet; and
  - (a2) recording the digital interface format (DIF) sequence in which the IEEE 1394 packet is striped off, in the plurality of clip files.
- 20 3. The method of claim 1, wherein the digital interface format (DIF) sequence, which is one of digital video (DV) 25 or 50 formats, is recorded in step (a).
4. The method of claim 1, wherein step (a) is recorded  
25 substantially in real-time.
5. The method of claim 1, wherein step (b) includes recording mapping information which maps duration time information on a corresponding clip to address information in which video data belonging  
30 to the corresponding clip is recorded, in the clip navigation file.

6. The method of claim 1, wherein step (c) includes recording an identifier of a corresponding clip file and start time and end time of duration of the corresponding clip file in the program navigation file.

5 7. A method for recording video data on an information storage medium, the method comprising:

(a) recording video data in a digital video format in a plurality of clip files in real-time;

10 (b) recording navigation data to navigate the clip files in a clip navigation file;

(c) recording a program navigation file which represents at least one said clip files and at least a part of the corresponding clip navigation file; and

15 (d) recording program information which represents at least one of the program navigation files, in a manager file.

8. The method of claim 7, wherein step (b) includes recording mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, in the clip navigation file.

9. The method of claim 7, wherein step (b) includes recording a broadcasting format of the video data received in step (a) in the clip navigation file.

25

10. The method of claim 9, wherein the broadcasting format is an NTSC or PAL mode.

11. An apparatus for recording video data in a digital video

format received from a camcorder on an information storage medium, the apparatus comprising:

a video interface which receives the video data;

a recorder which records data on the information storage medium;

5 and

a controller which controls the recorder to let the recorder

record video data inputted to the video interface in at least one clip file,

to record navigation data to navigate the generated clip files in a clip

navigation file, to record a program navigation file which represents at

10 least one said clip files and at least a part of the corresponding clip

navigation file, and to record program information which represents at

least one of the program navigation file, in a manager file.

12. The apparatus of claim 11, wherein the video interface  
15 comprises:

an IEEE 1394 port which receives an IEEE 1394 packet in which  
a digital interface format (DIF) sequence is packaged ; and

a buffer which stores the digital interface format (DIF) sequence in  
which the IEEE 1394 packet is striped off.

20

13. The apparatus of claim 11, wherein the video interface  
receives a digital interface format (DIF) sequence, which is one of digital  
video (DV) 25 or 50 formats.

25 14. The apparatus of claim 11, wherein the controller controls  
the recorder to let the recorder substantially record the video data  
received from the video interface in real-time.

15. The apparatus of claim 11, wherein the controller controls

the recorder to let the recorder record mapping information which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, in the clip navigation file.

5

16. The apparatus of claim 11, wherein the controller controls the recorder to let the recorder record an identifier of a corresponding clip file and start time and end time of duration of the corresponding clip file in the program navigation file.

10

17. An information storage medium comprising:  
a plurality of clip files in which video data in the format of digital video received from a camcorder is recorded;  
a navigation file in which navigation data to navigate the clip files  
15 is recorded;

a program navigation file in which navigation data which represents at least one said clip files and at least a part of the corresponding clip navigation file is recorded; and

20 a manager file in which program information is stored in at least one of the program navigation file.

18. The medium of claim 17, wherein a digital interface format (DIF) sequence in which the IEEE 1394 packet is striped off, is recorded in the clip files.

25

19. The medium of claim 17, wherein a digital interface format (DIF) sequence, which is one of digital video (DV) 25 or 50 formats, is recorded in the clip files.

30

20. The medium of claim 17, wherein mapping information



which maps duration time information on a corresponding clip to address information in which video data belonging to the corresponding clip is recorded, is recorded in the clip navigation file.

5           21.    The medium of claim 17, wherein an identifier of a corresponding clip file and start time and end time of duration of the corresponding clip file are recorded in the program navigation file.

          22.    The medium of claim 17, wherein a broadcasting format of  
10   video data recorded in the clip files is recorded in the clip navigation file.

          23.    The medium of claim 22, wherein the broadcasting format is an NTSC or PAL mode.

15

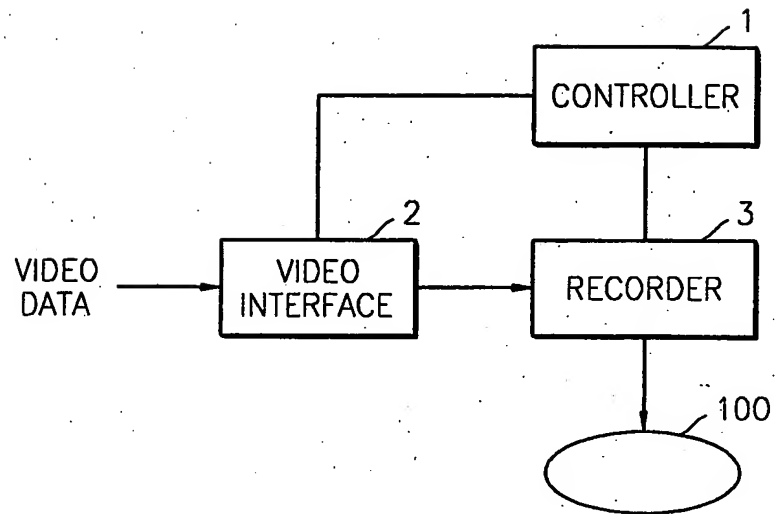
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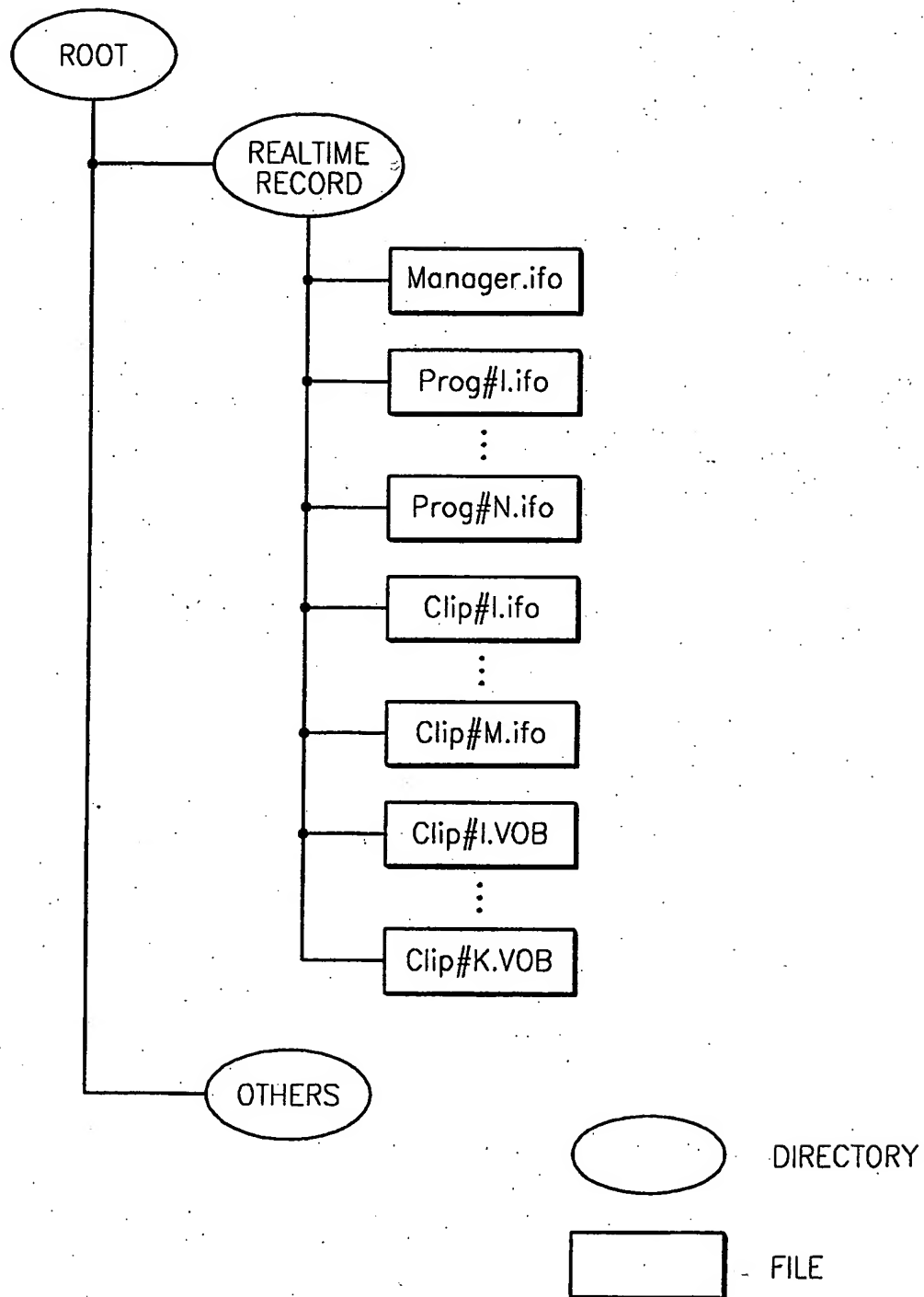
1/6

FIG. 1



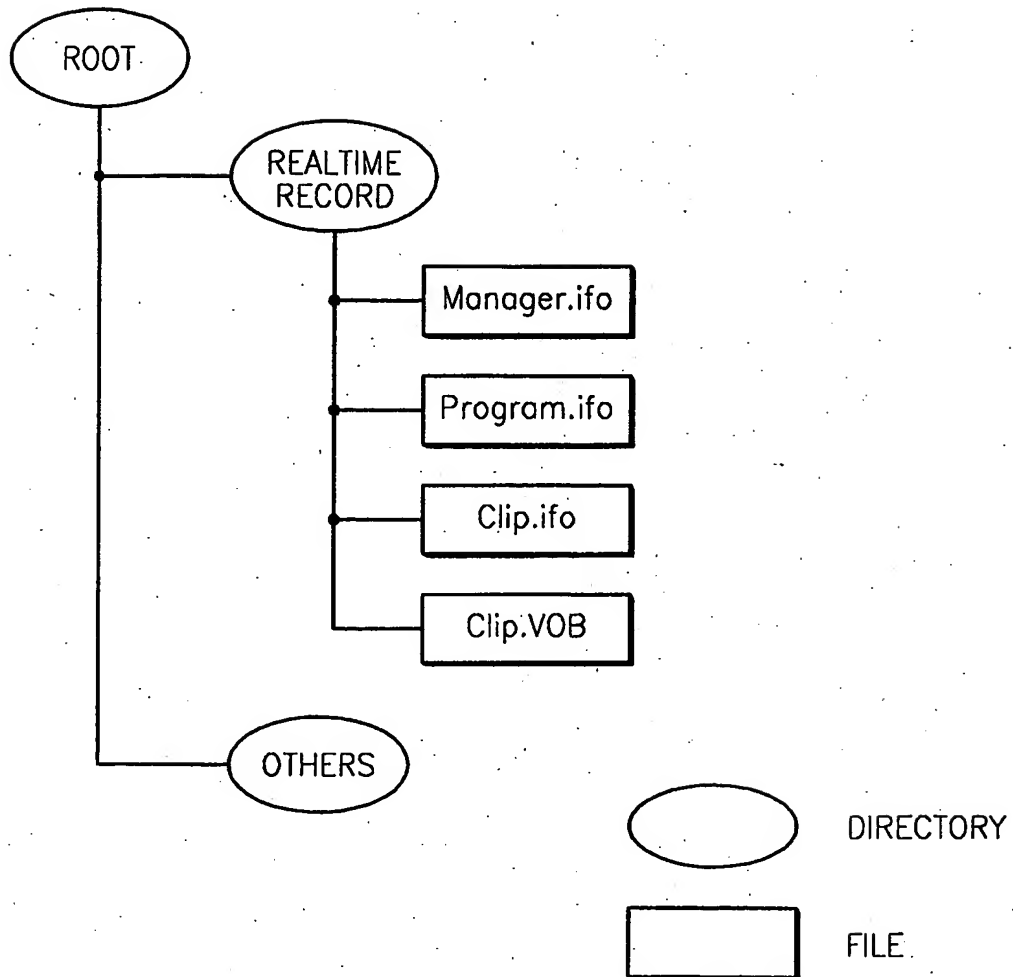
2/6

FIG. 2



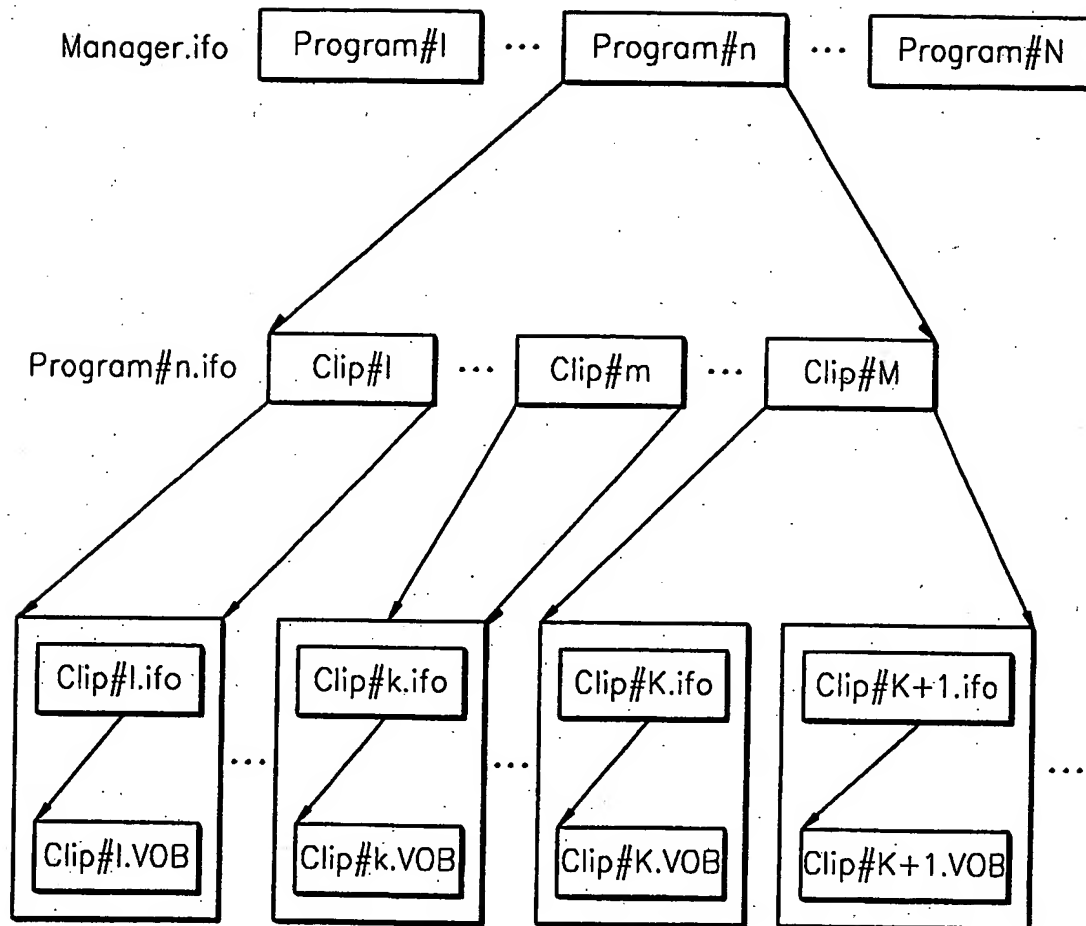
3/6

FIG. 3



4/6

FIG. 4



5/6

FIG. 5

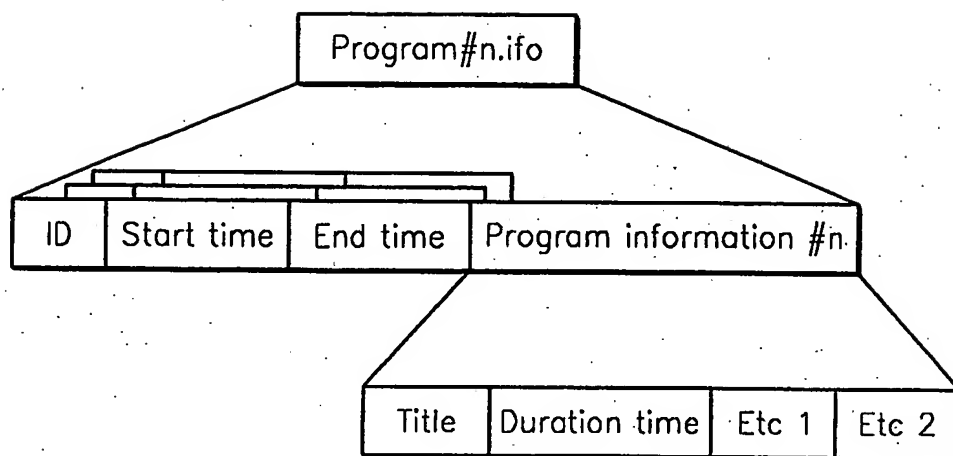
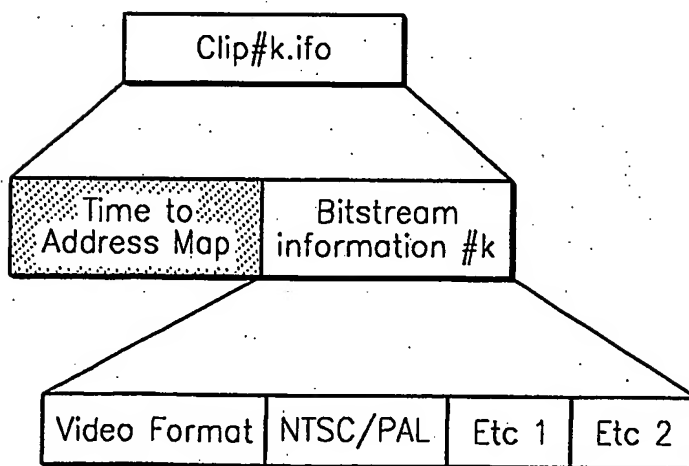
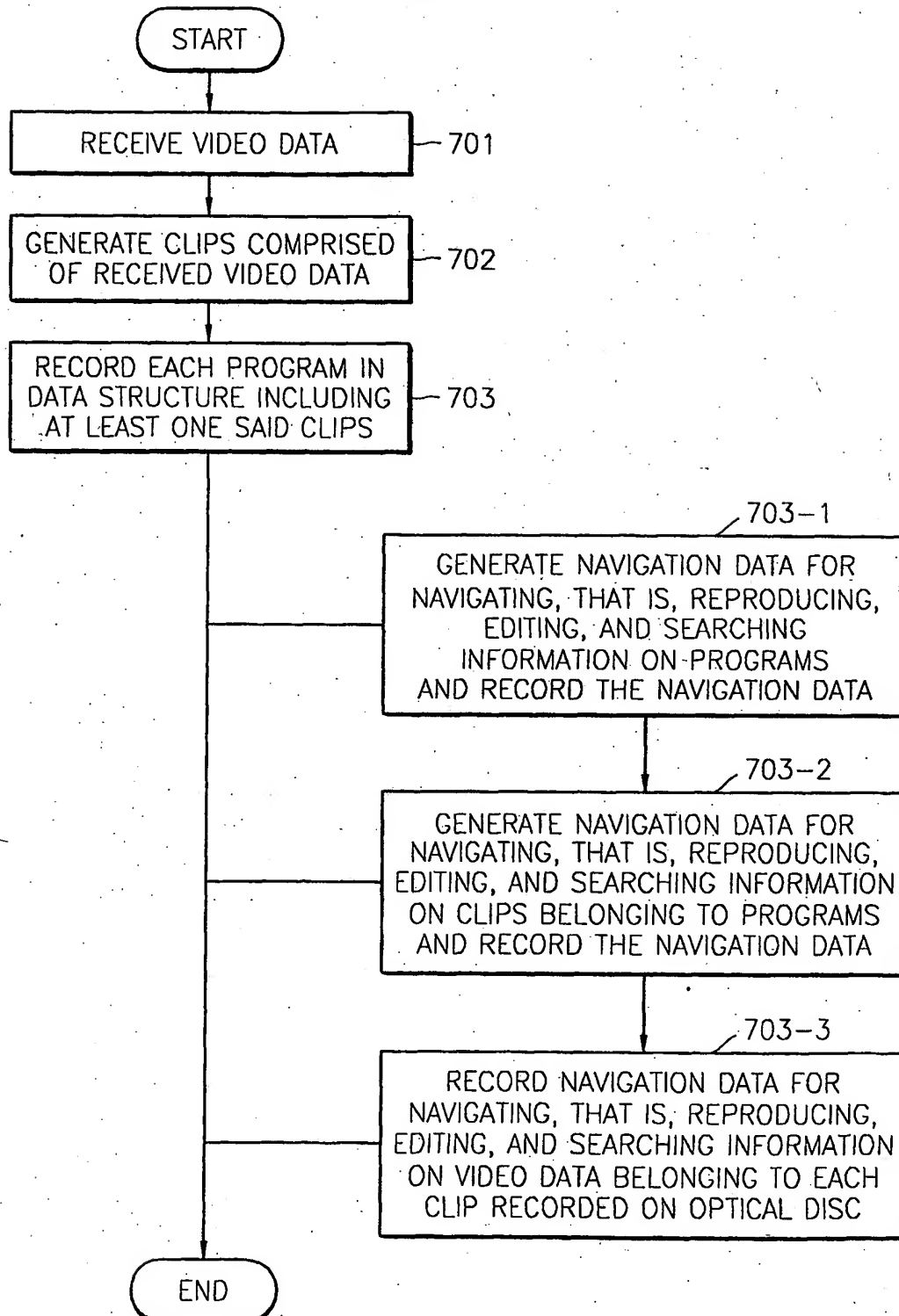


FIG. 6



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FIG. 7



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR02/01801

**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 G11B 20/10**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7 G11B, H04N

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

KR, JP : IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	JP 10-11952 A (HITACHI LTD) 16 JANUARY 1998 See the whole document	1, 7, 11, 17
Y	JP 03-169180 A (TOSHIBA CORP) 22 JULY 1991 See the whole document	1, 7, 11, 17
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A, P	US 6,330,211 B1 (U.S. Philips Corporation) 11 December 2001 See the whole document	1, 7, 11, 17

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# EUROPEAN PATENT OFFICE

## Patent Abstracts of Japan

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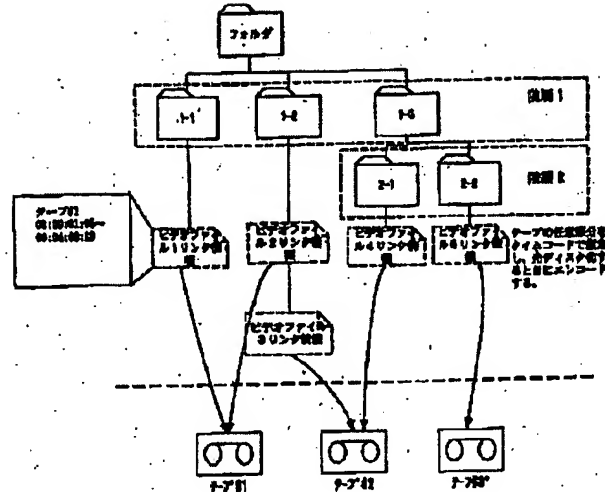
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TITLE : DATA PROCESSOR, DATA  
PROCESSING METHOD, AND  
COMPUTER READABLE RECORDING  
MEDIUM STORED DATA PROCESSING  
PROGRAM



ABSTRACT : PROBLEM TO BE SOLVED: To reduce a creation cost compared with the case of converting a format previously by performing a format conversion according to an optical disk in the data processor for creating a multimedia optical disk, such as a DVD, after taking material information for recording.

SOLUTION: In a data processor which convert material information recorded on an information recording medium, such as a video tape, into a format for optical disk, and records it in an optical disk based on scenario information, the scenario structure of the optical disk is expanded in a storage device as a hierarchized folder structure (1-1, 1-2 or the like). Besides, linking information (time cord) indicating the arbitrary portion of the information recording medium corresponding to the reproduction picture is stored in the folder from the desired position of the optical disk, by storing the identification information on the information recording medium as a file and converting the format of the material information based on the identification information.

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